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Background: The US Food and Drug Administration (FDA) has granted Emergency Use Authorization (EUA) for multiple PCR-based tests to aid in the diagnosis and containment of COVID-19. A vast majority of these tests detect only SARS-CoV-2 which causes symptoms similar to those caused by other respiratory pathogens. Hence, other etiologies or co-infections requiring a different therapy may be missed. The prototype BioFire® Respiratory Panel 2.1 (RP2.1) continues the syndromic approach of the FDA-cleared BioFire® Respiratory Panel 2 (RP2), to provide the ability to simultaneously detect 22 common respiratory pathogens, including SARS-CoV-2, from nasopharyngeal swab (NPS) specimens. The goal of this study was to rapidly develop a RP2.1 prototype that contains high-performing SARS-CoV-2 assays and maintains the performance of assays retained from RP2.

Methods: Twelve assays designed for four SARS-CoV-2 genes were tested for compatibility with the RP2 assays and conditions. All retained RP2 assays were evaluated to verify established RP2 performance. The sensitivity of novel SARS-CoV-2 assays was estimated with nucleic acids at BioFire and contrived live virus NPS samples at MRIGlobal. Primer homology of SARS-CoV-2 assays to > 15,000 SARS-CoV-2 genomes from accessible databases was assessed for *in silico* inclusivity

Results: A prototype multiplexed PCR panel containing assays for 22 pathogens was developed in a 5-week period. Of the 12 SARS-CoV-2 assays, 7 were compatible with the RP2 conditions; 2 were selected for the prototype. No false positive results due to cross-reactivity with unintended analytes or non-specific amplification in negative samples were observed for any assays. All retained RP2 assays were detected at or near their established LoD. The SARS-CoV-2 LoD was estimated at 10^3 -10^2 genomes/mL with both nucleic acid and live virus spiked into NPS. Together, the assays are 100% inclusive for all 15,370 complete SARS-CoV-2 genomes assessed *in silico* for reactivity.

Conclusion: The results of this study indicate a strong potential for RP2.1 to serve as a sensitive comprehensive syndromic option to aid in the diagnosis of COVID-19 as well as respiratory syndromes caused by other pathogens, including co-infections.

This study was performed with a test not cleared for diagnostic use.

Disclosures: **All Authors**: No reported disclosures

411. Application of a SARS-CoV-2-specific serologic assay for translational research and surveillance

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Background: Sensitive and specific SARS-CoV-2 antibody diagnostics are urgently needed to estimate the seroprevalence of SARS-CoV-2 infection in both the general population and special risk groups. Moreover, validated serologic assays are critical to understanding immunity to SARS-CoV-2 infection over time and identifying correlates of protection.

Methods: An enzyme-linked immunosorbent assay (ELISA) protocol to detect antibodies (IgG) that bind the receptor-binding domain (RBD) of the SARS-CoV-2 spike protein was validated and ROC curve analysis performed by testing a large panel of pre-pandemic sera (n=162) and convalescent sera from RT-PCR-confirmed COVID-19 cases (n=60). We then applied this test in two cohorts: 1) Healthcare personnel (HCP) that were enrolled in a longitudinal surveillance cohort just after peak local transmission and 2) Mildly ill patients being tested for SARS-CoV-2 infection by RT-PCR from NP swabs in an ambulatory testing clinic.

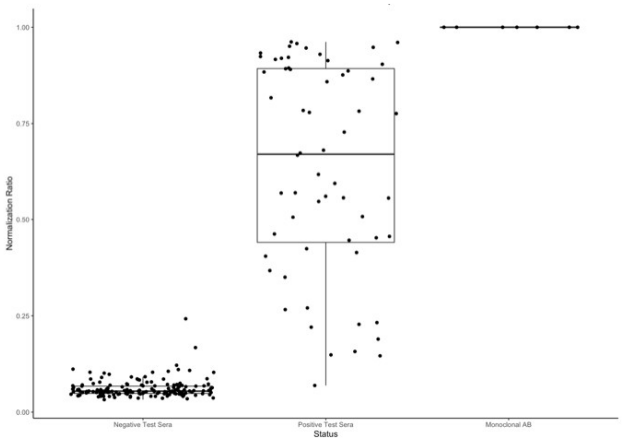
Demographics of mildly symptomatic patients tested for SARS-CoV-2 with RT-PCR

Table 1. Characteristics of mildly symptomatic patients tested for SARS-CoV-2 with RT-PCR.

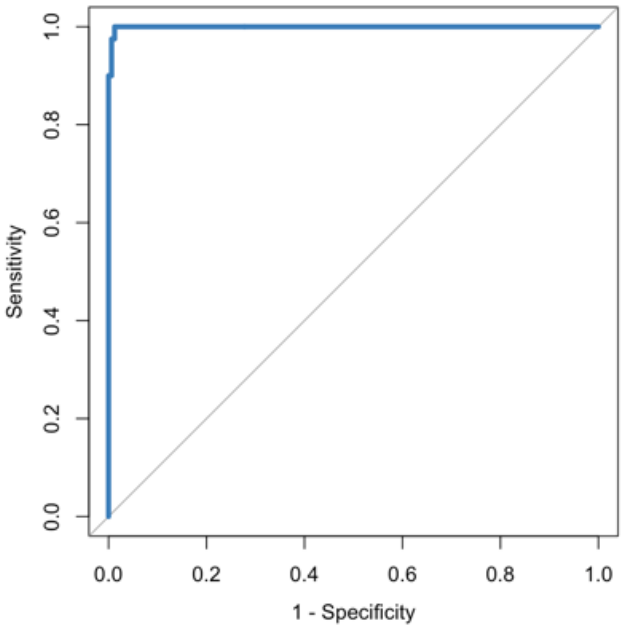
Characteristics	Positive PCR	Negative PCR	Total
Sex, n (%)			
Male	4 (50%)	4 (50%)	8 (42%)
Female	1 (9%)	10 (91%)	11 (58%)
Age (years), mean ± SD	52 ± 18	43 ± 14	45 ± 15
Race, n (%)			
Non-Hispanic White	3 (27%)	8 (73%)	11 (58%)
Non-Hispanic Black or African American	2 (40%)	3 (60%)	5 (26%)
Asian	-	3 (100%)	3 (16%)

Results: ROC curve analysis yielded an AUC of 0.9953, with a sensitivity and specificity at 91.67% and 99.38% at the optimal OD normalization threshold of 0.20. In 240 HCP surveilled at enrollment, 5.83% had positive IgG results. Of 19 symptomatic patients who presented to the ambulatory clinic, 5/19 had a positive PCR. In convalescence (13–74 days post symptom onset), 3 of those 5 were positive for IgG.

Validation of the SARS-CoV-2 RBD ELISA



ROC Curve Analysis



Conclusion: We demonstrated high sensitivity and specificity of the SARS-CoV-2 RBD ELISA. This simple assay is an efficient way to track seroconversion and duration of antibody responses to SARS-CoV-2 for different populations, particularly since RBD-binding antibodies have been shown to correlate with neutralization activity and may be useful to determine protective immunity following natural infection or vaccination. Ongoing work will assess variation in magnitude, character and duration of antibody responses in key populations and seek to maximize deployability of large-scale SARS-CoV-2 serology.

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412. Assessment and Capability of SARS-CoV-2 Detection in the Veterans Health Administration

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Session: P-13. COVID-19 Diagnostics

Background: Rapid scale up of testing to detect Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is essential to direct clinical management, optimize infection control actions, and guide public health response efforts to mitigate the spread of Coronavirus Disease 2019 (COVID-19). As the largest integrated health care system in the United States, the Veterans Health Administration (VHA) supported the laboratory-based detection of COVID-19 in a network of 170 medical centers across the country.